WHAT IS CLAIMED IS:

1. An optical system for detecting contaminants and defects on a test surface comprising:

a source of light to produce a beam;

means for directing the beam along a path onto the test surface, producing an illuminated spot thereon;

an ellipsoidal mirrored surface having an axis of symmetry substantially coaxial with the path, defining an input aperture positioned proximate to the test surface to receive scattered light therethrough from the surface, the mirrored surface reflecting and focusing light that is rotationally symmetric about said axis of symmetry and that passes through the input aperture at an area; and

means for detecting light focused to the area.

2. The optical system of claim 1, said mirrored surface having an exit aperture opposite to the input aperture, said system further comprising a lens assembly disposed between the input aperture and the exit aperture to collect light passing through the input aperture, defining collected light, said lens assembly focusing the collected light substantially at the area, wherein the lens assembly includes a first and a second lens positioned between the input and exit apertures.

3. The optical system of claim 1, wherein the beam is incident on the test surface at an angle substantially normal thereto.

4. The optical system of claim 3, further including at least one lens positioned in the path of the beam to vary the size of the spot.

5. The optical system of claim 1, said ellipsoidal mirrored surface having two foci, wherein the mirrored surface is placed with said illuminated spot substantially at one of the two foci.

6. The optical system of claim 1, said ellipsoidal mirrored surface having two foci, wherein the mirrored surface is placed with one of the two foci substantially at said area.

7. The optical system of claim 1, said detecting means including a detector and an aperture placed substantially at the area.

8. The optical system of claim 1, said illuminated spot being less than 50 microns in dimensions.

9. The optical system of claim 1, further including means, positioned in the path of specularly reflected light, for blocking specularly reflected light from the test surface and stray light generated by the optical system from impinging on the detecting means.

10. The optical system of claim 1, wherein the detector means includes an array of detecting elements.

11. The optical system of claim 1, further including means for selecting passing scattered light having a predetermined range of scattering angles.

12. The optical system of claim 1, further including an attenuator attenuating the light focused to said area before it is detected by the detecting means.

13. The optical system of claim 1, further including a means for placing the beam in a circular state of polarization.

14. The optical system of claim 1, further including a field stop that restricts light focused to the area in a image plane in a confocal manner, thereby attenuating detection of unwanted stray light.

15. An apparatus for detecting anomalies of surfaces, comprising:

means for directing a light beam towards a surface in a direction substantially normal to the surface, said direction defining an axis;

means for causing relative motion between the surface and the beam, so that the beam scans the surface; and

means for detecting light scattered by said surface around the axis;

said detecting means including at least two detectors, said at least two detectors comprising a first detector located to detect light scattered by the surface within a first range of collection angles from the axis and a second detector located to detect light scattered by the surface within a second range of collection angles from the axis, said second range being different from the first range, wherein said detecting means including at least one lens for collecting light to be detected, said directing means directing light towards the surface along an illumination path that does not pass through said at least one lens.

16. The apparatus of claim 15, said detecting means including a first aperture for the first detector and a second aperture for the second detector, said

first and second apertures having different aperture sizes.

17. The apparatus of claim 15, said directing means including at least one beam expander for shaping and focusing the light beam and at least one illumination aperture.

18. The apparatus of claim 14, said first range of angles being about 3 to 25 degrees, and said second range being about 25 to 70 degrees.

19. The apparatus of claim 15, said detecting means including at least three detectors located to detect light scattered by the surface within at least a first, second and third range of collection angles from the axis, said first range of angles being about 3 to 25 degrees, and said second range being about 25 to 65 degrees, and said third range being about 65 to 85 degrees.

20. The apparatus of claim 15, said directing means including a beam deflector for deflecting light from a light source towards the surface, said deflector also shielding the first and second detectors from specular and semi-specular reflection.

21. The apparatus of claim 20, said detecting means including at least one lens for collecting light to be detected, said deflector being located between the surface and the at least one lens.

22. The apparatus of claim 15, said two detectors having different intensity detection thresholds.

23. The apparatus of claim 15, said second detector including a collection mirror and a photo-sensitive device, said mirror being substantially ellipsoidal in shape.

24. The apparatus of claim 23, said directing means directing the light beam towards a spot on the surface, said mirror having two foci, wherein the mirror is placed with said spot substantially at one of the two foci.

25. The apparatus of claim 24, said detecting means including a first aperture for the first detector and a second aperture for the second detector, said first aperture being placed substantially at the remaining foci.

26. The apparatus of claim 24, said directing means directing the light beam towards a spot on the surface, said spot being less than 50 microns in dimensions.

27. The apparatus of claim 15, said directing means directing the light beam towards a spot on the surface, said spot being less than 50 microns in dimensions.

28. The apparatus of claim 15, one of the two detectors including a mirror having an entrance port therein, said illumination path passing through said entrance port.

29. An apparatus for detecting anomalies of surfaces, comprising:

means for focusing a light beam along a path towards a spot on a surface, causing a specular reflection, said spot having dimensions less than 50 microns;

means for causing rotational and translational movement of the surface, so that the beam scans the surface along a spiral path;

a first detector located to detect light scattered by the surface within a first range of collection angles and a second detector located to detect light scattered by the surface within a second range of collection angles, said second range being different from the first range;

an ellipsoidal mirrored surface defining an input aperture positioned proximate to the surface to receive scattered light therethrough from the surface, the mirrored surface reflecting and focusing light passing through the input aperture at the first detector; and

a lens assembly to collect light passing through the input aperture, defining collected light, said lens assembly focusing the collected light substantially to the second detector.

30. The apparatus of claim 29, said focusing means focusing light towards the surface along an illumination path that does not pass through said lens assembly.

31. The apparatus of claim 30, said ellipsoidal mirrored surface having a hole therein, said illumination path passing through said hole.

32. The apparatus of claim 29, said directing means including a beam deflector in the illumination path for deflecting light from a light source towards the surface, said deflector also shielding the first and

second detectors from specular and semi-specular reflection.

33. The apparatus of claim 32, said deflector being located between the surface and the lens assembly.

34. The apparatus of claim 32, the deflector blocking specular and semi-specular reflection so that said first range of angles is about 3 to 25 degrees, said second range being about 25 to 70 degrees.

35. The apparatus of claim 29, said detecting means including at least three detectors located to detect light scattered by the surface within at least a first, second and third range of collection angles from the axis, said first range of angles being about 3 to 25 degrees, and said second range being about 25 to 65 degrees, and said third range being about 65 to 85 degrees.